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LEAD-ZINC DEPOSITS AT THE LAKE CLAIMS CHORAGE, ALASKA
WRANGELL DISTRICT, SOUTHEASTERN ALASKA

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INTRODUCTION

The lead-zinc deposits at the Lake claims are on the mainland of southeastern Alaska about 11 miles east of Wrangell (see fig. 1). The deposits are about 6½ miles by trail, and by boat across Lake Virginia, from tidewater on Eastern Passage. A Forest Service trail starts a few hundred feet north of the mouth of Mill Creek on Eastern Passage and leads to the southwest end of Lake Virginia, a distance of about 1 mile (see fig. 2). Lake Virginia is a little more than 2 miles long. The trail to the deposits starts on the south bank of Porterfield Creek 2 miles east of Lake Virginia across the creek from the sludge trail to Groundhog Basin.

The deposits are a little more than 1 mile by trail from Porterfield Creek. They are several hundred feet below timberline between the altitudes of 1,325 feet and 1,725 feet, and are near the crest of a long narrow ridge between Porterfield Creek and Glacier Creek (see fig. 2). The claims are reported to belong to J. G. Galvin of Wrangell, Alaska. This group of claims is probably the same group described by the Wrights as the Margery group.

Buddington 2/ briefly described the deposits in 1923. This report summarizes a six-day examination of the deposits by the Geological Survey in September, 1943.

Most of the exploratory work was done 20 years or more ago. The principal mineralized zone is exposed by two adits, herein designated no. 1 and no. 2, and by several trenches and stripped areas. The trenches are now almost entirely slumped or grown over. The mineralized zone is still exposed in the stripped areas.

1/ Wright, F. E., and C. W., The Ketchikan and Wrangell mining districts, Alaska: U. S. Geol. Survey Bull. 347, pp. 189-190, 1908.

2/ Buddington, A. F., Mineral deposits of the Wrangell district: U. S. Geol. Survey Bull. 739, pp. 64-65, 1923.

The northernmost adit, no. 1 (see fig. 3), at an altitude of about 1,425 feet, is 450 feet south of the cabins. The no. 1 adit follows the mineralized zone for 25 feet. The portal of the no. 2 adit, at an altitude of about 1,420 feet, is 110 feet southwesterly from the no. 1 adit. The no. 2 adit consists of an 85-foot crosscut which intersects the mineralized zone 67 feet from the portal and a drift which follows the mineralized zone for 25 feet north from the crosscut and for 110 feet south from the crosscut.

A third adit, herein called the no. 3 adit, at an altitude of about 1,550 feet is 350 feet southwesterly from adit no. 2. The adit is inaccessible because the entrance is caved.

GEOLOGY

The lead-zinc deposits are in a sequence of metamorphic rocks near its eastern contact with a quartz diorite mass. The exact position of the contact of the metamorphic rocks with the quartz diorite (see fig. 2), is inferred, but its general configuration, as shown, is probably correct.

The metamorphic rocks are generally fine-grained. They include dark phyllites and slates, quartzites, chloritic schists, and light-colored micaceous phyllites and schists. Bedding and cleavage in the metamorphic rocks are generally parallel, but locally there are small tight folds in which the bedding is discordant with the cleavage. The general trend of the cleavage of the metamorphic rocks near the deposits is N. 15° E., but the strike ranges from about N. to about N. 30° E. The cleavage at most places near the deposits is vertical or steep to the southeast.

A large fault zone is parallel or nearly parallel to the cleavage of the metamorphic rocks. Two basic sills border this fault zone, one near the hanging wall and one near the footwall. Another basic sill about 8 feet thick crops out 415 feet southwesterly from the no. 3 adit. The sills are dark green to black and fine-grained.

Similar basic sills are known in the nearby Groundhog and Glacier Basins where they are definitely younger than the quartz diorite and probably younger than the zinc mineralization. It is inferred that the sills at the Lake Claims are also post-mineralization and post-quartz diorite. No ore minerals occur in the sills.

ORE DEPOSITS

The ore contains galena, the principal ore mineral, and sphalerite, pyrite, and a little chalcopryrite. The gangue minerals include quartz; a carbonate, probably calcite; and the silicate minerals of the metamorphic rocks.

The ore is localized in the fault zone which is 10 feet to 25 feet thick. The degree of shearing in the fault zone ranges widely--locally bands of gouge up to a foot thick have been developed; elsewhere the rocks are only moderately

sheared. The bands of gouge have been traced only short distances. The ore within the fault zone is discontinuous and the relative amounts and proportions of the sulfide minerals range widely from place to place.

In general, three types of ore are distinguished. The richest ore is coarsely crystalline galena forming veins that fill fractures up to 6 inches wide parallel to the fault zone. The veins contain bands of coarse-grained and fine-grained galena. Locally, between these bands, are thin lenses or pods of sphalerite and chalcopyrite up to 1 inch long. The veins pinch and swell, and contain small vugs, some of which are lined with quartz crystals.

A second type of ore is coarse galena and sphalerite in a matrix of quartz or calcite or both, which cements the fragments in breccia bands within the fault zone. These breccia bands are from 4 foot to 6 feet thick. The size and number of rock fragments in the breccia range appreciably from place to place. Many fracture surfaces and vugs in the breccia are coated with drusy quartz.

The first and second types of ore, at places, grade into one another. The fissure filling was accompanied by alteration and replacement by sulfide minerals and silica of the rock along the fractures and along the bedding planes. The quartz-filled breccia zones resemble some of the veins in the Groundhog Basin and Glacier Basin areas. ^{3/} The vein and breccia types of ore are generally in about the middle of the fault zone.

The third type of ore consists of sphalerite and galena in small fractures which make a coarse network of thin veinlets in fractured and sheared metamorphic rocks. Some sphalerite and galena is in narrow veinlets along bedding planes. From these bedding-plane veinlets replacement by ore minerals extends slightly into the rocks. Sphalerite is more abundant than galena in this ore.

At least seven galena and sphalerite-bearing veinlets less than 2 inches thick are known outside of the fault zone. These veinlets are nearly parallel to the bedding. Not all of these veinlets are shown in figure 3.

In a small gully 165 feet southeasterly from the cabins a few narrow fractures containing scattered galena are exposed in the fault zone. A basic sill lies in the fault zone near the west wall of the fault.

A vein of nearly solid galena about 4 inches thick is exposed in the no. 1 adit. The vein pinches out to the southwest in the adit. A basic sill is exposed along the east wall of the adit. The metallized zone a few feet north from the portal of adit no. 1 is about 3 feet wide.

The main fault zone and two basic sills within it are exposed in the drift of the no. 2 adit. At intervals along the crosscut of this adit are veinlets of galena less than 1 inch thick. A 1-foot zone of breccia-type ore is exposed

^{3/} Gault, H. R., Zinc deposits of the Groundhog Basin, Wrangell district, southeastern Alaska, U.S. Geol. Survey mimeographed report, March 1944. ---, Unpublished field notes on Glacier Basin on file in the Alaskan Branch of the Geological Survey, 1943.

in the crosscut 27 feet in from the portal. The ore now exposed in the drift of the no. 2 adit is lean and much of it is of the breccia type. The vein ranges from 3 inches to about 2 feet in thickness. Along the east wall of the drift north from the crosscut is a quartz vein containing abundant pyrite. On the face of the drift south from the crosscut is a 6-inch band of gouge and about 4 feet of ore of the network type in which sphalerite is the most abundant sulfide mineral.

The metallized zone exposed in the south face of the drift is at least 5 feet wide. On the surface above the drift in adit no. 2 is a stripped area about 80 feet long. A basic sill is exposed along the eastern edge of the stripped area. Adjacent to the sill on the west is a zone of ore of the network type in the center of which is vein ore. Some portions of the vein are almost solid galena and the maximum thickness of the vein is about 18 inches. The width of the metallized zone in this 80-foot area ranges from 3 feet to 8 feet and averages about 6 feet.

South of the stripped area for about 180 feet are several small exposures of the breccia- and network- types of ore. About 40 feet southwesterly from the end of the 80-foot stripped area is an exposure of breccia-type ore within a small fault zone outside of the main fault zone. This small fault zone possibly is an extension of the 1-foot breccia zone 27 feet in from the portal of adit no. 2.

Another stripped area 60 feet long is 180 feet south of the 80-foot stripped area. Within the 60-foot stripped area the ore is dominantly of the breccia type and is 2 feet to 10 feet wide. Basic sills are exposed along the footwall and near the hanging wall of the fault zone. Some ore of the network type lies east of the basic sill near the hanging wall of the fault zone at the north end of the stripped area. The ore in this 60-foot stripped area appears to be the richest exposed ore.

Two trenches are 940 feet and 1,025 feet southwesterly from adit no. 2. The full width of the fault zone is exposed in the most northerly of these two trenches. In this trench the zone is about 12 feet wide and contains several narrow veins of galena. They are parallel to the fault zone and aggregate a total thickness of about 4 inches. Within the fault zone small fractures cut the foliation and some contain galena and sphalerite. Breccia ore is exposed near the hanging wall of the fault zone and network ore is exposed near the footwall. The most southerly of the two trenches exposes about 5 feet of ore of the network type and two basic sills, one on either side of the fault zone.

About 350 feet southwesterly from the portal of adit no. 2 is a galena - calcite vein 1 inch to 3 inches thick. The vein is in a zone of moderately sheared rock. Adit no. 3 is reported to have been driven along this vein. This vein is not in the main fault zone. Two other galena - calcite veins less than 1 inch wide, are exposed along the trail 60 feet northeasterly from adit no. 3.

It is believed that the ore was deposited from fluids which possibly were differentiates of the nearby quartz diorite mass. The ore deposition was localized along fractures and fault zones. Silicification and carbonatization accompanied ore deposition.

RESERVES

Tonnage

Buddington ^{4/} reports that one ton of ore was shipped to the Selby smelter in 1920. No other production from the deposits is known.

The known horizontal extent of the metallization of the fault zone is about 1,450 feet. However, because of lack of sufficient exposures, ore is inferred only in two intervals along the 1,450-foot extent. One of these intervals is between adit no. 1 and the small outcrop 440 feet southeasterly from adit no. 1. The average width of the metallized zone is about 6 feet. Assuming a factor of 10 cubic feet of rock per ton, there would be about 260 tons of ore per foot of depth.

The second area of inferred ore is at the southern end of the 1,450-foot extent. This area is about 180 feet long and its average width is about 9 feet. If all of this 180-foot area is ore, there would be about 160 tons per foot of depth.

Grade

Chemical analyses of samples collected by the Geological Survey (see fig. 3) are given in the following table.

Grade of ore at the Lake Claims

Sample	Length of sample in feet	Type of ore	Pb in percent	Zn in percent	Ag in oz. per ton.
L-1(1)	3.0	Network ore	0.30	0.26	0.07
L-2(1)	1.2	Gouge	0.43	0.48	0.09
L-3(2)	1.5	Vein ore	6.52	2.20	0.67
L-4(2)	2.0	Network ore	0.94	1.20	0.14
L-5(2)	4.0	Network ore	0.16	0.16	0.07
L-6	9.0	Network ore	0.70	0.93	0.09
L-7	4.0	Breccia ore	1.14	2.25	0.09

- (1) Aggregate length of L-1 and L-2 represents width of mineralized zone in south face of drift in adit no. 2.
- (2) Aggregate length of L-3, L-4, and L-5 represents approximate full width of mineralized zone.

^{4/} Buddington, A.F., Unpublished field notes on file in the Alaskan Branch of the Geological Survey, 1921.

The weighted average of the grade of ore calculated from these data is: lead, 1.03 percent; zinc, 1.01 percent; and silver, 0.05 ounces per ton. This average grade is for the widths of the mineralized zone used in estimating the tonnage. The average grade could be raised appreciably by mining only vein-type ore and the richer portions of the breccia-type ore. The estimated tonnage using only vein-type ore and the richer parts of the breccia ore also would be much smaller.

RECOMMENDATIONS

If the lead-zinc deposits are explored further, all of the old surface workings should be cleared out and several new trenches dug to explore the fault zone more adequately in covered areas, particularly south of adit no. 3 and north of adit no. 1. Samples should be cut at frequent intervals at the surface and underground.

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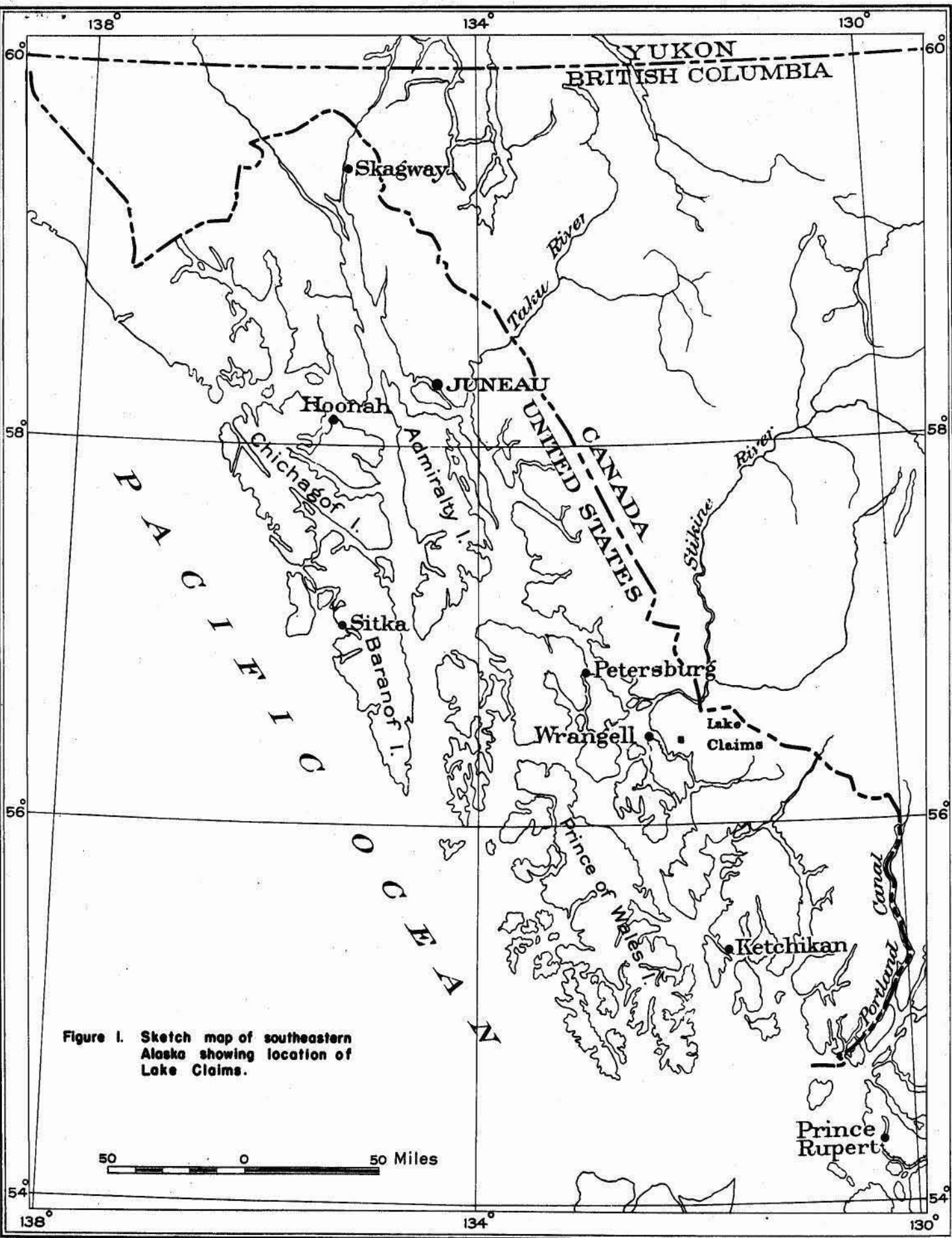


Figure 1. Sketch map of southeastern Alaska showing location of Lake Claims.